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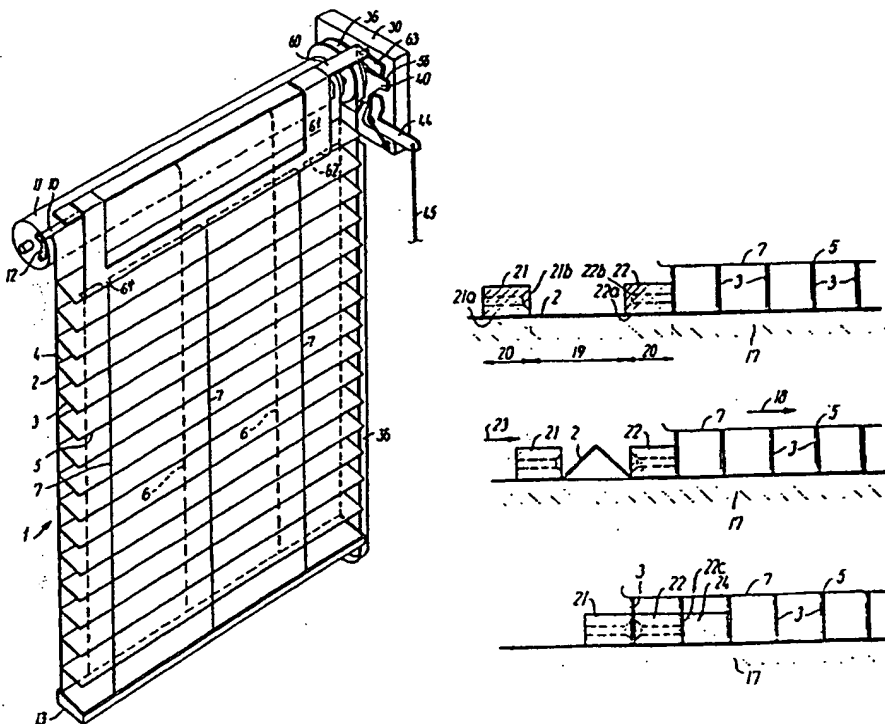
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(21) International Application Number: PCT/DK94/00216 (22) International Filing Date: 6 June 1994 (06.06.94) (30) Priority Data: 0659/93 7 June 1993 (07.06.93) DK (71) Applicant (for all designated States except US): JULIUS KOCH INTERNATIONAL APS [DK/DK]; 45 Amaliegade, DK-1256 Copenhagen K (DK). (72) Inventors; and (75) Inventors/Applicants (for US only): ODGÅRD, Mads [DK/DK]; 6B St. Kannikestræde, DK-1169 Copenhagen K (DK). JENSEN, Lars, Damm [DK/DK]; 45 Amaliegade, DK-1256 Copenhagen K (DK). (74) Agents: JESSEN, Ivar, Bergshagen et al.; International Patent-Bureau, Høje Taastrup Boulevard 23, DK-2630 Taastrup (DK).		(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report.	

(54) Title: A METHOD AND AN APPARATUS FOR THE MANUFACTURE OF A CURTAIN WITH VANES, AND A METHOD AND DEVICE FOR CONTROLLING THE VANES

(57) Abstract

According to this method a curtain web (2) is woven or crocheted with alternating more open (20) and more closed (19) sections extending across the width of the web, the more closed sections are folded along their centre lines across the web and the sides of the fold are squeezed together and bonded to each other in order to make a plane vane (3), control threads (7) are attached to the front edges of the vanes, and reinforcing threads are attached to the rear side of the web. The vanes may be opened while the curtain is in an arbitrary position by moving the gripping element (60, 61, 62) towards the curtain (1) such that its edge holds the free edge (5) of a vane, while the hinged edge (4) of the vane is lowered by rolling the web slightly downwards. The device for controlling the vanes has a releasing arm (44), which holds a movable stop (40) either in a position wherein the gripping element is swung towards the curtain or in another position wherein an edge (56) on the stop by way of an arm (63) on the gripping element has swung said gripping element away from the curtain.



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A method and an apparatus for the manufacture of a curtain with vanes, and a method and device for controlling the vanes.

The invention relates to a method and an apparatus
5 for the manufacture of a curtain comprising a web with sections, which allow passage of light, and vanes extending across the web on the front of said web, where one of the edges of the vanes is tiltably connected to the web while the other edge is connected to control
10 means for tilting the vanes. The invention also relates to a method and a device for controlling the vanes.

From DK Patent 67326 a curtain of the described kind is known. The known curtain, which is designed as a roller blind, can in one embodiment comprise a web of
15 open fabric to which a number of vanes are hinged along one of their edges by means of a small strip of a flexible material, while tapes fastened to the other edge, are attached at the top to the winding rod about which the web is wound and at the bottom to a bottom
20 rod, which also is fixed to the web. When the curtain is completely rolled down, the vanes can be opened by rotating the rod about which the web is wound half a revolution backwards. However, it is not possible to open the vanes when the curtain is only partially rolled
25 down.

EP published patent application no. 0 482 793 describes a curtain comprising two parallel webs between which parallel vanes are placed, and where the vanes can be opened and closed by a translational motion
30 of the two webs with respect to each other. In the description it is stated that the front web can be replaced by a number of parallel threads extending in the direction of the web. This curtain is manufactured in a complicated machine where an adhesive is applied

to a strip of material, from which the vanes are made, along the top side of one of the edges of the strip and along the bottom side of the other edge, after which the strip is cut into lengths corresponding to the width of
5 the curtain and are bonded onto each of the two curtain webs.

As a consequence of the bonding along the top and bottom sides of the vanes, respectively, the vane acquires a slight S-shaped cross section, and it is
10 stated that this has a tendency to tilt the vanes towards the closed position. In the case of thicker vanes, the edges of the vanes must be bent such that a hinge-like connection is obtained.

The object of this invention is to provide a method
15 for the manufacture of a curtain of the type described above, in which the complicated manufacture of vanes and attachment of these to the curtain web is entirely avoided.

The object is according to the invention achieved
20 in that the web is woven or crocheted with sections which extend across the entire width, and which alternately have a more open and a more closed structure, in that each of the sections with a more closed structure is folded across the web along the centre line of the
25 section, while the adjacent sections with a more open structure are kept plane, in that the facing surfaces of the fold are pressed together and fixed to each other by gluing or melting them together, thereby forming plane vanes projecting from the front side of the web,
30 in that the control means for tilting the vanes are formed by threads, which are fastened to the free edges of the vanes, and in that reinforcing threads are attached to the rear side of the web in the longitudinal direction of the web.

Thereby a substantial simplification of the manufacturing process is achieved, since the entire task of producing individual vanes and attaching these to the web by means of special strips or bonding is avoided.

5 The method has the further advantage that the hinged connection is included as a natural part of the web and therefore does not spoil the appearance of the curtain, as is the case with a strip or vane that is bonded on. The use of reinforcing threads bonded onto the back
10 gives the finished curtain sufficient stability as well as dimensional stability, such that it has a neat appearance even after many years of use, and ensures that the vanes in both the open and closed positions are straight and parallel. The sections with a more open
15 structure can be woven or crocheted such that they allow for the passage of 25-50% of the incoming light, while the sections with a more closed structure can be woven or crocheted such that they allow for the passage of up to 20% of the incoming light. It is also possible to
20 make the sections with different colours, thus obtaining an additional means for controlling of the amount of light passing through the curtain.

A preferred embodiment of the method is characterized in that the web is conveyed across a smooth
25 table, in that two sets of rails, each having two mutually perpendicular planes, are moved from an initial position towards the table, in that the web is pressed against the table on each side of a section having a more close structure by means of one of the surfaces of
30 each rail, and the other surfaces are placed such that it is flush with the dividing line between the more closed section and the adjacent more open sections, in that the sets of rails are moved towards each other in order to fold the more close section, in that the web
35 material is squeezed together between the facing sides

of the sets of rails during the process of bonding or melting together, and in that the sets of rails are moved away from the web to their initial positions.

Another embodiment is characterized in that the threads for tilting the vanes are attached while the vane is firmly held between the sets of rails, and in that the vane produces in the previous step at the same time is held in a position perpendicular to the web. Thereby it is assured that the thread connecting the free edges of the two vanes is given the correct web during its attachment, such that the distance between the free edges of the vanes in the finished curtain - when in the fully open position - becomes the same as the distance between the hinged edges next to web.

In a third embodiment, a number of weft threads are omitted from the transitional area between the sections in case of a woven web, respectively the stitches are made larger in case of a crocheted web. As a result the hinged connection becomes particularly flexible, as the connection between the vane and the web only consists of the warp threads, respectively the stitched threads running in the longitudinal direction of the web, and the resistance of said threads to bending in a direction the threads is negligible. As a consequence the vanes can more easily be kept straight and wrinkles on the web are avoided when the vanes are moved.

A fourth embodiment is characterized in using a glue which is activated by infrared light or ultrasonic sound. The glue can be applied either in liquid form or as a thin foil, which is put on to the web before folding the vane. With this gluing method one avoids exposing the web to strong local heating or shrinking, which can produce an unwanted local warping or wrinkling of the web. The glue may be omitted if the web is made of a material which allow the sides of the fold to be

joined by welding of the material, for example by ultrasonic welding.

A fifth embodiment is characterized in moving the web from a supply roll via a dancer roll over a gap
5 extending across the web between two supporting surfaces, in momentarily stopping the web by holding means immediately downstream of the gap and folding the web by pressing it through the gap by means of a blade like element, and in gripping the fold between a head of an
10 ultrasonic device and an abutment surface and fixing the facing surfaces of the fold to each other by ultrasonic welding, thereby forming a vane. In this embodiment the web is folded in a positive way by the blade like element, and has the advantage compared with the method
15 according to the second embodiment that the speed of folding and the quality of the fold is less dependent upon the type of material used.

According to a sixth embodiment the vanes are given a plane or arcuate shape in the forming step. In some
20 cases it is preferred to give the vanes a slightly hollow cross section as this allows the curtain to take up less space when rolled on to the winding rod. The hollow cross section also results in a more rigid vane where the free edge has less tendency to sag between the
25 threads for tilting the vanes.

The web can be stabilized against stretching and shrinking. The purpose of this stabilization is to assure that the finished curtain is not twisted out of shape, by which the vanes at one side of the curtain for
30 instance would have a tendency to be more open than at the other side. This stabilization can be done in a known manner, for instance by heating the web to approximately 300 degrees C or by coating or impregnating the web.

The invention also relates to an apparatus for fabricating a curtain according to the method described above, characterized in that it comprises a roller stand for a supply roll, a dancer roller and driving rollers
5 for conveying a web of material from the supply roll, two supporting surfaces forming between them a gap extending across the path of the web, means for holding the web immediately downstream of the gap and means to move a bladelike element into the gap between the two
10 supporting surfaces, and an ultrasonic welding device with a welding head and a corresponding abutment surface to grip a folded section of the web and form a vane.

In a preferred embodiment of the apparatus the surface of the welding head and the corresponding
15 abutment surface is plane or arched to give the vane a plane or arcuate shape respectively.

The invention also relates to a method for controlling the vanes of a curtain of the type comprising a web with sections that allow passage of light, and vanes
20 extending across the width of the web on its front side, where one of the edges of the vanes is tiltably connected to the web while the other edge is connected to control means for tilting the vanes, particularly but not exclusively a curtain manufactured by the method
25 according to one or more of the preceding claims, and where the curtain is mounted on a winding rod.

It is described in the aforementioned DK-patent no. 67326 that the top edge of the web and the strips are attached to two generatrices of a cylindrical winding
30 rod positioned diametrically across from each other, and that the curtain when fully rolled down and with the connecting diameter of the two generatrices being horizontally, the relative lengths of the web and the strips, respectively, are adjusted such that the vanes
35 lie horizontally between the web and the strips, which

mainly hang vertically downwards from their respective lines of attachment. When turning the winding rod such that the suspension point of the strips is moved downwards and towards the web, the free edge of the 5 vanes is lowered while the edge at the web is elevated, which after half a revolution results in the vanes being entirely closed. When turning the winding rod further the rolling up of the curtain may begin.

US Patent No. 2,853,130 describes a roller blind 10 in which a bearing tap placed near one edge of an at the end of the top slat rests on a stationary strap when the blind is lowered to its bottom position. By further turning of the winding rod the slats are opened by cords connecting the other edge of the top slat with the slats 15 below.

GB Patent No. 1,098,855 describes a roller blind for outdoor use, where heavy slats are carried at their ends in pins placed near one edge of the slat and forming parts of side chains running in vertical guides. 20 A chain connects the other edge of each slat with a topmost slat. The topmost slat may be manoeuvred into a side track at the top of the vertical guide, thereby tilting the slat and consequently tilting the other slats. None of these prior art solutions allow tilting 25 of the slats when the blind is not in the fully lowered position. In both cases the top slat is tilted by applying a tarque at one end of the slat. This only works when the slat is ridgid, but will not work with soft vanes maded of a waven or crocheted material.

30 The method according to the invention differs from the known method in that essentially the whole length of the free edge of any of the vanes when located near the winding rod is firmly held at a certain level below the axis of the winding rod, and in that the hinged edge 35 of said vane is moved between the level of the free edge

and a higher level by turning the winding rod. With this method the free edge of a vane can be seized and held, regardless of how far the curtain is pulled down. The adjustment of the opening angle of the vanes is thus possible, even though the curtain is not fully rolled down, which makes the curtain much more useful for the control of incoming light than the known curtain. In a preferred embodiment the free edge of the vane is held by a means, which from a passive position at a distance 10 from the front of the curtain is swung into an active position, where it engages the under side of the vane at said free edge.

The invention also relates to a device for controlling the vanes of a curtain fitted on a winding rod and 15 of the type that comprises a web with sections that allow passage of light, and vanes, which extend across the width of the web on its front side, where one of the edges of the vanes is tiltably connected to the web and the other edge is connected to control means for tilting 20 the vanes particularly, but not exclusively a curtain manufactured by the method according to claims 1-8, and where the vanes are controlled by the method according to claim 11 or 12, in the manner just described. The device according to the invention is characterized in 25 that it comprises an oblong gripping element of a length comparable to the winding rod, said gripping element being parallel to the axis of the winding rod, and where said gripping element is turnable about an axis parallel to the axis of the winding rod and located above said 30 axis, a releasable stop, which in a passive position prevents the gripping element from engaging with the curtain and in an active position allows for the said engagement, and a friction clutch between the stop and the winding rod for returning the stop to the passive 35 position when rolling up the curtain.

The gripping element can be designed as a plate shield which at the same time serves the purpose of screening or hiding the winding rod. The friction clutch not only serves the purpose of returning the stop, but 5 prevents the curtain from rolling down as a result of the gravitational pull in the already partially rolled down section of the curtain.

In a preferred embodiment of the device the gripping element has cutouts for the control means.

10 The invention will now be described in more detail by means of some embodiments and with reference to the drawing, in which

Figure 1 shows a curtain with vanes manufactured by the method according to the invention, and with a 15 device according to the invention for controlling the vanes by the method according to the invention.

Figure 2a a part of a woven curtain web according to the invention

Figures 2b-2d illustrations of the folding of the 20 curtain web in Figure 2 for making a vane.

Figure 3 side view of the device for controlling the vanes, shown in the position where the vanes are closed,

Figure 4 side view as in Figure 3, but shown in the 25 position where the vanes are open,

Figure 5 sectional view along the line V-V in Figure 3, and

Figure 6 an end view of a bottom list for the curtain in Figure 1, and

30 Figure 7 schematic illustration of an apparatus according to the invention.

The curtain shown in Figure comprises a web 2 with vanes 3, which are manufactured by the method described below. Each vane 3 is in a hinge-like manner connected 35 to the web 2 along its rear edge 4. At the front edge

5 of the vane threads 7 are attached, which connect all the vanes together. Reinforcing threads 6 extending in the longitudinal direction are bonded onto the back of the web .

5 At the top the curtain is attached to a cylindrical rod 10, which in a known manner is inserted into a winding rod 12 and is fixed by a swingable locking arm 12, which in the locked position engages with a circular groove in the rod 10. At the bottom the curtain is
10 terminated by a bottom list 13, which will be described further in the following in connection with the reference to Figure 6.

 The curtain web shown in Figure 2 is woven with alternating more open 15 and more closed 16 sections
15 extending across the longitudinal axis of the web. The sections 16 are folded as shown in Figure 2b by intermittently conveying the web over a table 17, as suggested by an arrow 18. Vanes that have already been produced 3 are shown on the right side of the figure,
20 said vanes being connected to a traversing thread, which is attached to each of the front edges 5 of the vanes. On the left side of the figure the location of a section 16 with a more closed structure is indicated by a double arrow 19, while the double arrows 20 show the location
25 of the adjacent sections 15 with a more open structure.

 Figure 2b shows in an end view also the two sets of rails 21 and 22, which are placed such that each set of rails lies along the borders of the section 16, while still being outside the said border. The set of rails
30 21 is in this case designed as a single rail extending across the entire width of the web, while the set of rails 22 consists of several pieces of rail, which are mounted in extension of each other with a spacing with respect to each other that allows for passage past the
35 threads 7 when the set of rails are lifted off the web.

Each set of rails has two mutually perpendicular surfaces 21a and 21b, respectively 22a and 22b. Each rail belonging to the sets of rails is in a manner not further specified attached to an overlying movable beam, 5 such that they can all be lifted off and lowered at the same time.

After having placed the sets of rails 21 and 22 with the respective surfaces 21a and 22a in contact with the web as shown in Figure 2b, the rail 21 is moved, as 10 shown in Figure 2c, towards the set of rails 22 as suggested by an arrow 23, which causes the web 2 to rise and fold along the centre line of the section 16. Figure 2d illustrates that the rail 21 is fully pressed against the set of rails 22 such that the folded section 16 now 15 forms a plane vane 3, which is squeezed between the surfaces 21b and 22b while perpendicular to the web 2. While in this position the two facing sides of the section are bonded together by activating an adhesive, which has previously been applied to the sections, the 20 said adhesive being activated or cured by means of infrared light emitted from the infrared light sources inserted into surfaces 21b and 22b as suggested by the broken lines. At the same time the thread 7 is attached to the free edge of the vane 3 by sewing. During this 25 process the vane produced in the previous step is firmly held by means of a third set of rails 24, which presses the vane against a face 22c of the set of rails 22, said face 22c being perpendicular to the web.

Referring to Figure 7 a web 2 of material for the 30 curtain is pulled from a supply roller 101 on a roller stand 102 by drive rollers 117 and 118. The web is carried around idler rollers, a dancer roller 103 and further idler rollers and braking rollers and passed over a gap between a surface 116 of a fixed table and 35 a surface 108 of a rail which is movable against the web

by means of a work cylinder 108a. Opposite rail 108 is placed another rail 107 which is movable against the web by means of a work cylinder 107a. A bladeliike element 122 is placed above the web and in line with the afore
5 mentioned gap. Element 122 may be moved down into the gap by a work cylinder 122a. Below table 116 is an ultrasonic welding device 105a with a welding head 105. Opposite welding head 105 is located an abutment surface 108b, which in this case forms a part of rail 108.

10 A reinforcing thread 6 is taken from supply roller 109 and welded to the web by means of a movable ultrasonic welding device 111 and a corresponding moveable abutment surface 110. A thread 7 with welding eyelets 126 for controlling the tilt of the vanes 3 is taken from
15 a supply roll by a set of drive rollers 124, passed over a photo cell 123 and the eyelets welded to the free edge of the vanes by means of a movable ultrasonic welding device 114 and a corresponding abutment surface 115. Pairs of drive rollers 119 and 121 keeps the web taught
20 and feeds the web to a take-up roll 120 for the finished curtain.

The apparatus in Fig. 7 works in the following way. The web 2 is pulled from supply roll 101 via dancer roller 103 by rollers 117 and 118. When the centerline
25 of a section of the web with a more open structure passes the centerline of the gap, the drive rollers 117 and 118 are stopped and surfaces 107 and 108 are moved against the web by work cylinders 107a and 108a to clamp the web. The bladeliike element 122 is moved down against
30 the web by work cylinder 122a and folds the web. The necessary material for forming the fold is pulled from the web on the opstream side of element 122. The newly formed fold is gripped between surfaces 105 and 108b and the facing sides of the fold is welded to each other to
35 form a vane 3. The apparatus in Fig. 7 has an auxiliary

holding device 106a consisting of a rail similar to rail 107 which may be pressed against table 116 and thereby prevent the fold from unfolding before surfaces 105 and 107 has gripped the fold.

5 After forming the vane the reinforcement thread 6 is welded to the web as explained before. The control thread 7 is fitted with welding eyelets which are welded on to the free edge of the vanes 3. The ultrasonic welding device 114 is activated by the passage of an 10 eyelet in front of a photo cell 123, and by signals from other devices detecting the arrival of a vane.

The device shown in Figures 3-4 has a base plate 30, which is screwed onto a window frame 31. The plate 30 supports an axle 32, onto which a revoluble pulley 15 33 is axially attached by a screw 34 with a washer. The pulley 33 has a flat circular groove accommodating an endless strip 36 for rolling the curtain 1 up and down. The winding rod 11 is firmly connected to the pulley by means of two dowels 37 that enter holes 38 of the pulley 20 33, such that said rod 11 rotates with said pulley.

The pulley 33 supports a releasable stop 40 at the end adjacent to the window frame, said stop 40 being firmly held between two felt discs 41 and 42. The felt discs and the stop are axially fixed by a rear plate 43, 25 which is screwed onto the pulley.

A rotatable releasing arm 44 is screwed onto the base plate 30 while supporting a release string 45 and a stopper 46. The arm 44 is pressed against the stop 40 by a spring 47, and its movement in the opposite 30 direction is restricted by a stopping pin 48.

The base plate also supports a rotatably rod 60, the other end of which is rotatably journaled in a bracket (not shown) at the other end of the winding rod 11. As is best shown in Figure 1, a gripping plate 61 35 is mounted on the rod 60, said gripping plate at its

bottom being provided with a bent edge 62 for engagement with a vane 3.

The device works in the following way. The curtain 1 is rolled up and down by pulling one or the other of 5 the two parts of the endless strip 36, respectively. When rolling the curtain up the stop 40, is turned in the counter clockwise direction as seen in Figures 3 and 4, due to the friction clutch between the pulley 33 and the stop 40 formed by the felt discs, and a face 56 of 10 the stop strikes against an arm 63 on the gripping plate 61 and thus turns the edge 62 of said plate away from the curtain. When rolling the curtain down, the stop is held in the position shown in Figure 3, due to the stopper 46 of the releasing arm 44 interlocking with a 15 notch 49 on the stop 40. When the curtain is rolled up and down as described the vanes 3 are placed in their closed position as shown in Figure 3.

When the curtain is rolled down either entirely or partially, the vanes 3 can be opened by pulling the 20 release string 45, such that the stopper 46 is disengaged from the notch 49 and engages another notch 50 of the stop 40, which as a consequence of the weight of the curtain and/or pulling the strip 36 is turned to the position shown in Figure 4 by means of the friction 25 clutch. Thus the arm 63 is released and the gripping plate 61 rotates as a result of its weight, such that the edge 62 of the plate, being provided with cutouts in line with the threads 7, is placed in between the vanes of the curtain. When the curtain is rolled down 30 further, the free edge 5 of a vane 3 will be firmly held against the top side of the edge 62, while the rear edge 4 is lowered such that the vane is opened. At the same time all the underlying vanes are opened, as a result of the interconnecting threads 7.

When rolling the curtain up again from the position shown in Figure 4, the gripping plate is swung away from the curtain and the stop is locked in the position shown in Figure 3, as explained previously.

5 The bottom list comprises a U-profile 51, a closing list 52, and a locking list 53. The bottom list is fastened to the curtain by placing the lowest vane of the curtain inside the U-profile, i.e. in contact with the bottom side of the U-profile. The closing list and
10 the locking list are then slid in between the rear of the curtain and the threads 7, and is pressed downwards into the U-profile, where they snap under the longitudinally extending projection 54 on the inside of the flanges of the U-profile 51. Finally the bottom list is
15 closed at its ends by inserting a couple of end pieces (not shown). This bottom list has the advantage that the placement of the vane against the inside of the bottom of the U-profile by itself results in an accurate alignment of the list with respect to the curtain, which
20 assures that the curtain is not warped during the assembly.

C L A I M S

1. A method for the manufacture of a curtain (1) comprising a web (2) with sections (15), which allow passage of light, and vanes (3) extending across the web 5 on the front of said web, where one of the edges (4) of the vanes is tiltably connected to the web while the other edge (5) is connected to control means for tilting the vanes, characterized

- in that the web (2) is woven or crocheted with 10 sections (15,16), which extend across the entire width, and which alternately have a more open and a more closed structure,

- in that each of the sections (16) with a more closed structure is folded across the web (2) along the 15 centre line of the section, while the adjacent sections (15) with a more open structure are kept plane,

- in that the facing surfaces of the fold are pressed together and fixed to each other by gluing or melting them together, thereby forming vanes (3) 20 projecting from the front side of the web.

- in that the control means for tilting the vanes are formed by threads (7), which are fastened to the free edges (5) of the vanes (3), and

- in that reinforcing threads (6) are attached to 25 the rear side of the web in the longitudinal direction of the web.

2. A method according to claim 1, characterized

- in that the web (2) is conveyed over a smooth table (17),

30 - in that two of sets of rails, each having a surface (21a;22a) parallel to the table and a second surface (21b;22b) intersecting the first surface (21a;21b), where the second surfaces (21b;22b) face each

other and are mating surfaces, are moved from an initial position towards the table (17),

- in that the web (2) is pressed against the table (17) on each side of a section (16) having a more closed structure by means of the first surfaces (21a, 22a) of each rail, and the lines of intersection between the first and second surfaces are placed such that they are flush with the dividing line between the more closed section (16) and the adjacent more open sections (15),

10 - in that the sets (21,22) of rails are moved towards each other in order to fold the more closed section (15),

- in that the web material is squeezed between the facing second surfaces (21b, 22b) of the sets of rails 15 (21, 22) during the process of gluing or melting together, and

- in that the sets of rails (21,22) are moved away from the web (2) and returned to their initial positions.

20 3. A method according to claim 1 or 2, characterized

- in that the threads (7) for tilting the vane (3) are attached while the vane is held between the sets of rails (21, 22), and

25 - in that the vane (3) produced in the previous step at the same time is held in a position generally perpendicular to the web (2)

4. A method according to any of the preceeding claims, characterized

30 - in using a glue activated by infrared light or ultrasonic sound.

5. A method according to claim 1, characterized

- in moving the web (2) from a supply roll (101) via a dancer roll (103) over a gap extending across the 35 web between two supporting surfaces (108,116),

- in momentarily stopping the web (2) by holding means (107,108) immediately downstream of the gap and folding the web by pressing it through the gap by means of a bladelikey element (122), and

5 - in gripping the fold between a head (105) of an ultrasonic device (105a) and an abutment surface (108b) and fixing the facing surfaces of the fold to each other by ultrasonic welding, thereby forming a vane (3).

6. A method according to each of the preceding
10 claims, characterized

- in that the vanes (3) are given a plane or arcuate shape in the forming step.

7. A method according to each of the preceding claims, characterized

15 - in that a number of wheft threads are omitted from the transitional area between the sections (15, 16), in case of a woven web, respectively the stitches are made larger in case of a crocheted web.

8. A method according to each of the preceding
20 claims, characterized

- in that the web (2) is stabilized against stretching and shrinking.

9. Apparatus for fabricating a curtain according to the method of claims 1 - 8, characterized in that it
25 comprises

- a roller stand (102) for a supply roll (104), a dancer roller (103) and driving rollers (117,118) for conveying a web of material from the supply roll,

30 - two supporting surfaces (108,116) forming between them a gap extending across the path of the web,

- means (107,108) for holding the web immediately downstream of the gap and means (122a) to move a bladelikey element (122) into the gap between the two supporting surfaces (108,116), and

- an ultrasonic welding device (105a) with a welding head (105) and a corresponding abutment surface (108b) to grip a folded section of the web (2) and form a vane (3).

5 10. Apparatus according to claim 9, characterized in that the surface of the welding head (105) and the corresponding abutment surface (108b) is plane or arched to give the vane (3) a plane or arcuate shape respectively.

10 11. method for controlling the vanes of a curtain (1) of the type comprising a web (2) with sections (15) that allow passage of light, and vanes (3) extending across the width of the web on its front side, where one of the edges (4) of the vanes is tiltably connected to
15 the web while the other edge (5) is connected to control means (7) for tilting the vanes, particularly but not exclusively a curtain manufactured by the method according to one or more of the preceding claims, and where the curtain is mounted on a winding rod (11),
20 characterized

- in that essentially the whole length of the free edge (5) of any of the vanes (3) when located near the winding rod (11) is firmly held at a certain level below the axis of the winding rod, and

25 - in that the hinged edge (4) of said vane (3) is moved between the level of the free edge (5) and a higher level by turning the winding rod (11).

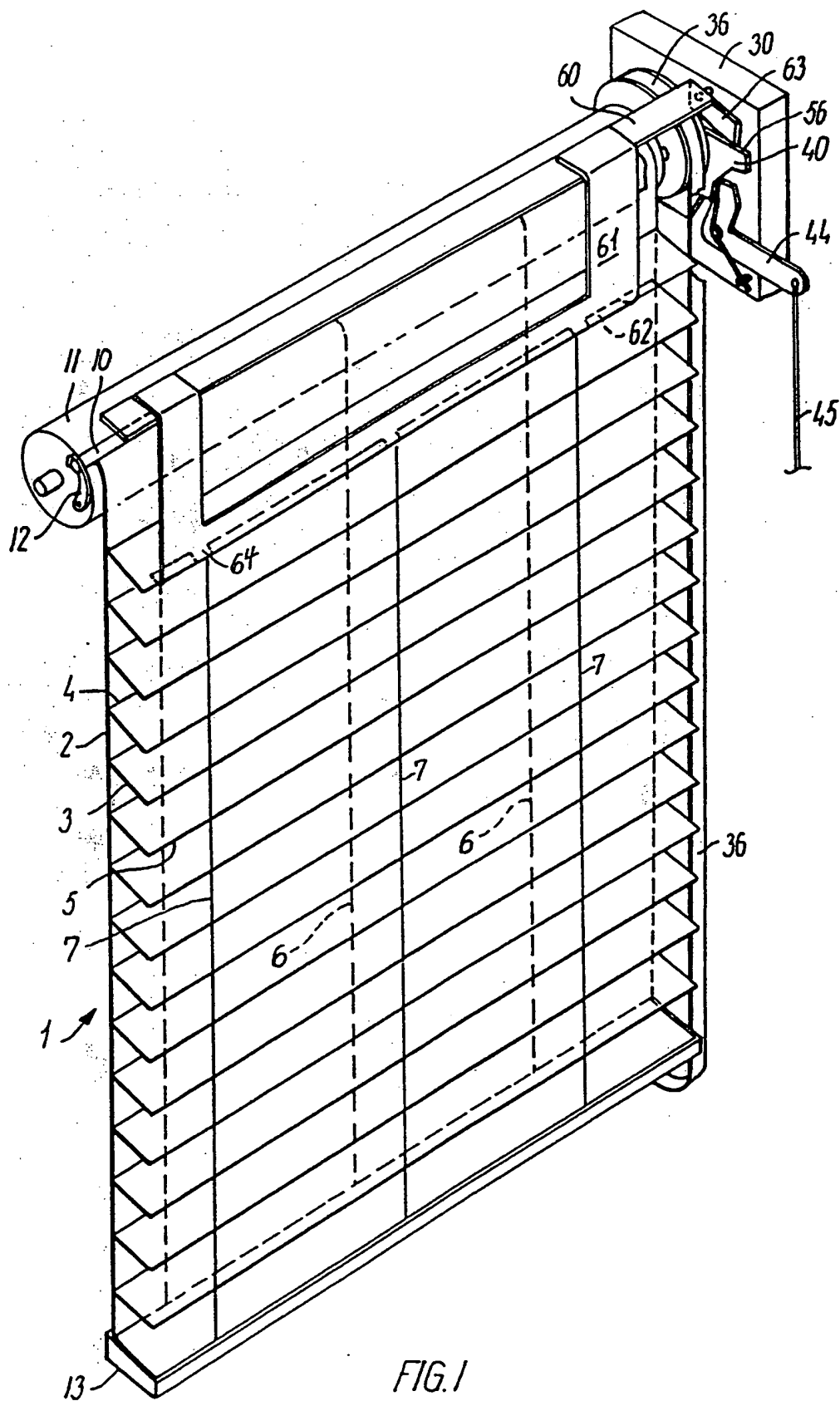
12. A method according to claim 11, characterized in that

30 - the free edge (5) of the vane (3) is held by a means, which from a passive position at a distance from the front of the curtain (1) is swung into an active position, where it engages the under side of the vane at said free edge.

13. A device for controlling the vanes (3) of a curtain (1) fitted on a winding rod and of the type that comprises a web (2) with sections (15) that allow passage of light, and vanes (3), which extend across the width of the web on its front side, where one of the edges (4) of the vanes is tiltably connected to the web and the other edge (5) is connected to control means (7) for tilting the vanes, particularly but not exclusively a curtain manufactured by the method according to claims 1-8, and where the vanes are controlled by the method according to claim 11 or 12, characterized in that

- it comprises an oblong gripping element (60, 61, 62), of a length comparable to the winding rod, said gripping element being parallel to the axis of the winding rod (11), and where said gripping element is turnable about an axis parallel to the axis of the winding rod and located above said axis, a releasable stop (40), which in a passive position prevents the gripping element (60, 61, 62) from engaging with the curtain (1) and in an active position allows for the said engagement, and a friction clutch (41, 42) between the stop (44) and the winding rod (11) for returning the stop to the passive position when rolling up the curtain.

14. A device according to claim 13, characterized - in that the gripping element (60, 61, 62) has cutouts (64) for the control means (7).



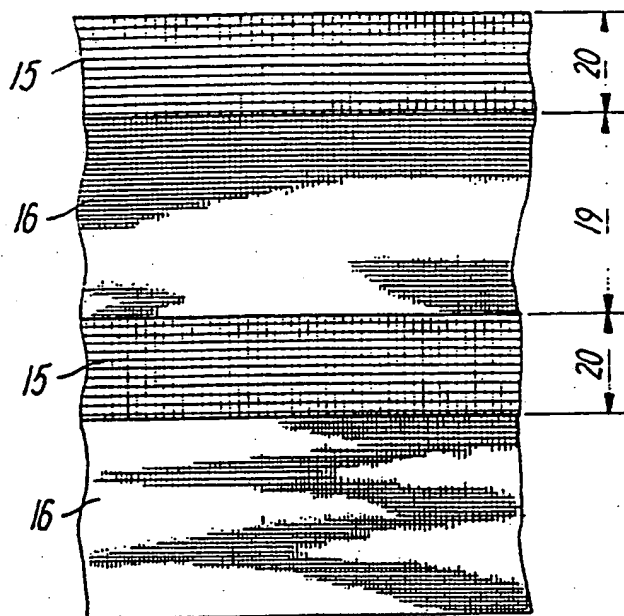


FIG. 2a

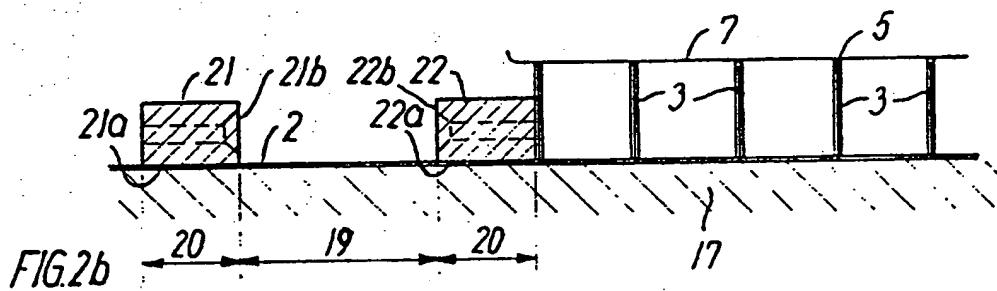


FIG. 2b

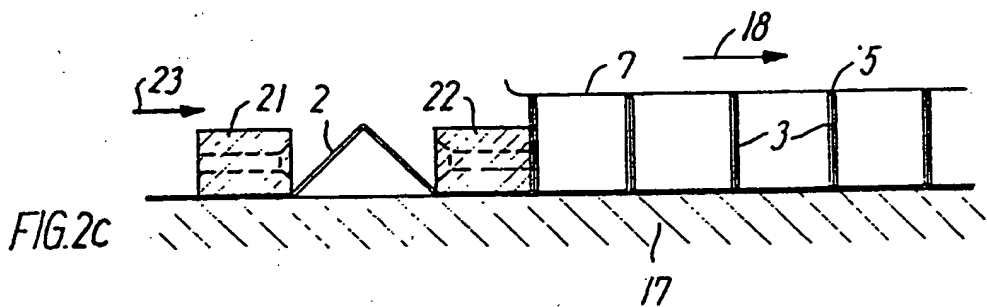


FIG. 2c

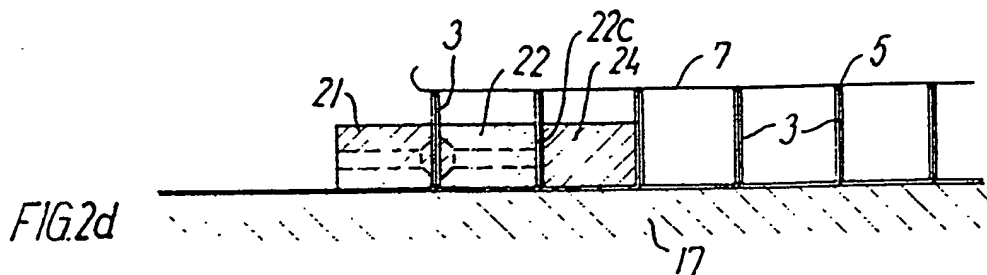
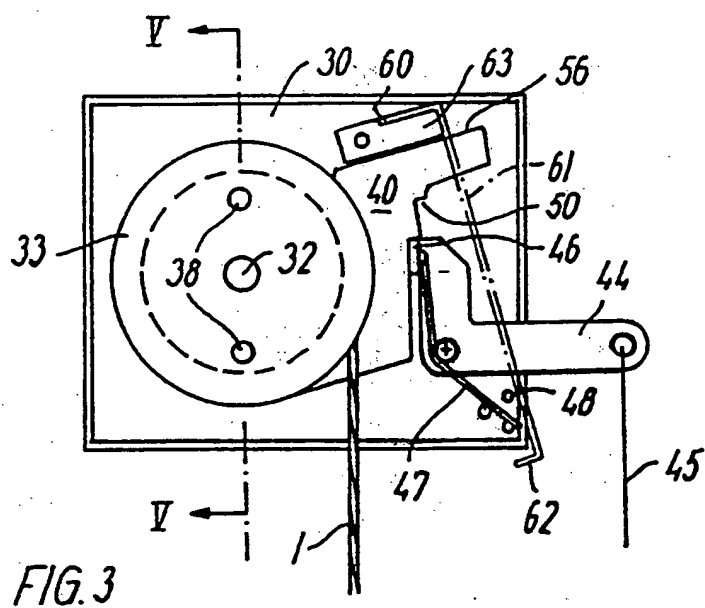


FIG. 2d



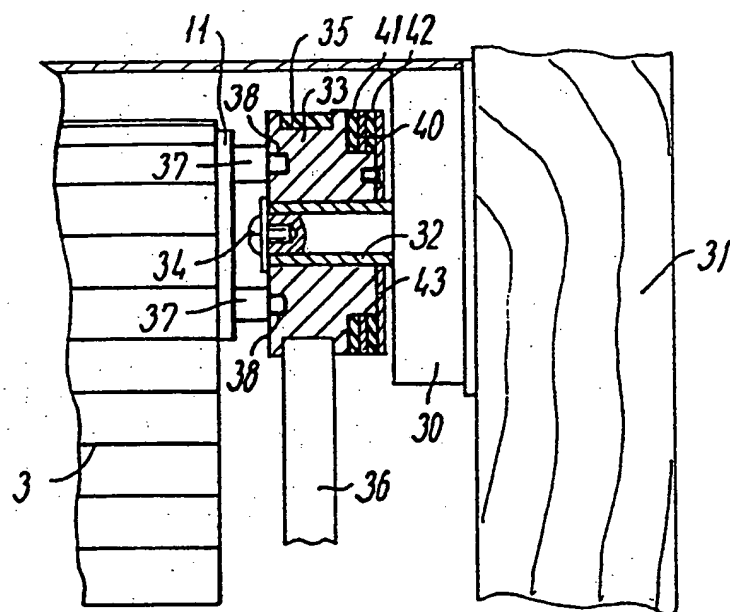


FIG. 5

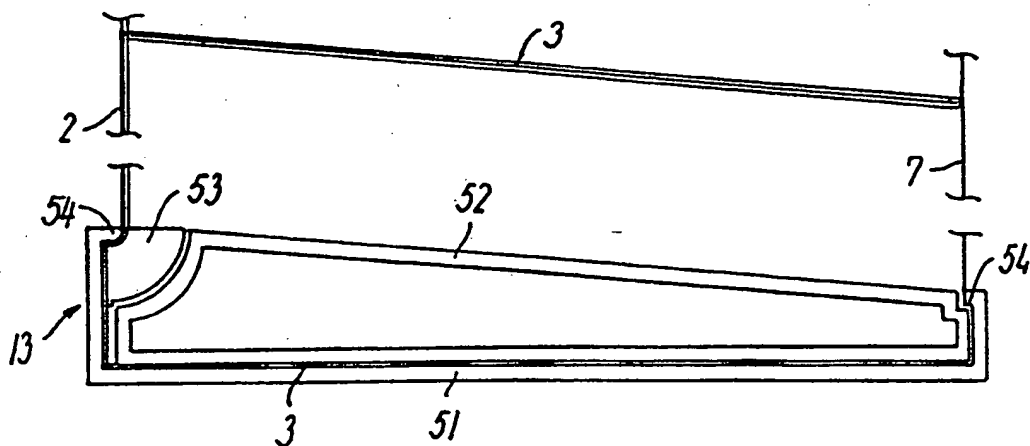


FIG. 6

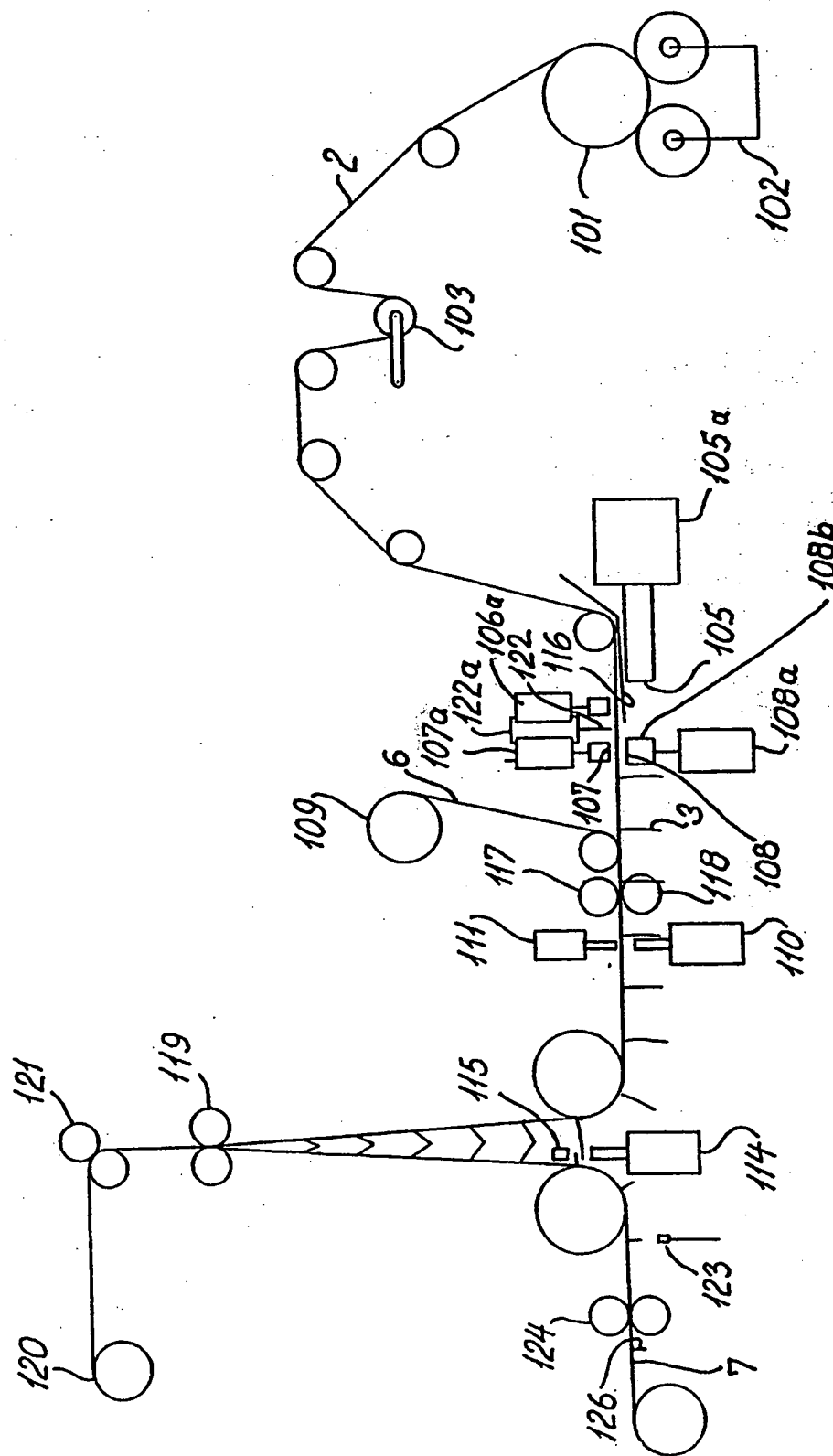


Fig. 7

INTERNATIONAL SEARCH REPORT

In International Application No
PCT/DK 94/00216

A. CLASSIFICATION OF SUBJECT MATTER

IPC 5 E06B9/266 B29C53/36 E06B9/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 E06B B29C B31F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,2 853 130 (BECHTLER) 23 September 1958 see column 3, line 35 - line 70; figures ---	1-14
A	WO,A,89 12415 (SCHNEBLY) 28 December 1989 see page 16, paragraph 2 - page 18, paragraph 1; figures 6A,6B,6C ---	1-14
A	GB,A,1 098 855 (GRAU) 10 January 1968 see page 3, line 10 - page 4, line 44; figures ---	1-14
A	EP,A,0 502 621 (BRITISH AEROSPACE PUBLIC LIMITED COMPANY) 9 September 1992 see the whole document ---	1-3
A	WO,A,90 04079 (SCHNEBLY) 19 April 1990 see page 26, paragraph 1; figures ---	1-3
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

30 August 1994

Date of mailing of the international search report

- 9. 09. 94

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INTERNATIONAL SEARCH REPORT

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR,A,1 364 674 (FROGET) 19 May 1964 see the whole document -----	1-3
A	US,A,4 535 828 (BROCKHAUS) 20 August 1985 see the whole document -----	1-3

INTERNATIONAL SEARCH REPORT

Information on patent family members

In tional Application No
PCT/DK 94/00216

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-2853130		NONE	
WO-A-8912415	28-12-89	US-A- 4884612 JP-T- 3505244 US-A- 4928369	05-12-89 14-11-91 29-05-90
GB-A-1098855		BE-A- 659381 DE-B- 1266475 NL-A- 6501514 OA-A- 1509	28-05-65 11-08-65 21-07-69
EP-A-0502621	09-09-92	US-A- 5211901	18-05-93
WO-A-9004079	19-04-90	US-A- 4945969	07-08-90
FR-A-1364674		NONE	
US-A-4535828	20-08-85	NONE	